CLAIMS

1. A method of forming an all thermoplastic, perfluorinated resin hollow fiber module comprising the steps of:

contacting a plurality of hollow fiber membranes made from one or more thermoplastic, perfluorinated resins with one or more molten thermoplastic, perfluorinated potting resins to form a substantially parallel array of said membranes;

said one or more potting resins being heated sufficiently above their peak melting point but at or below the peak melting point of the membranes such that they are applied to said membranes at a contact temperature which causes said one or more potting resins streams to flow around said hollow fiber membranes to form a bundle of hollow fiber membranes;

cooling said bundle;

heating said bundle to a temperature below the peak melting point of the hollow fibers and above the peak melting point of the one or more potting resins for a period sufficient to form a fluid-tight seal between the one or more potting resins and the hollow fiber membranes.

2. The method of claim 1 wherein the peak melting point of the one or more potting resins is at least 5°C below that of the hollow fiber membranes.

3. The method of claim 1 wherein the peak melting point of the one or more potting resins is at least 10° C below the peak melting point of the hollow fiber membranes.

4. The method of claim 1 wherein the one or more thermoplastic, perfluorinated resins of the hollow fiber membranes and the potting resins are selected from the group consisting of homopolymers, copolymers, blends of one or more homopolymers, blends of one or more copolymers and blends of one or more homopolymers and copolymers of perfluorinated resins.

5. The method of claim 1 wherein the one or more thermoplastic, perfluorinated resins of the hollow fiber membranes and the potting resin are selected from the group consisting of poly(TFE-co-PFAVE) resins and blends thereof.

6. The method of claim 1 wherein the bundle is heated to a temperature at or above the peak melting point of the one or more potting resins.

7. The method of claim1 wherein the plurality of hollow fiber membranes is formed prior to contacting said membranes with said potting resins by forming said membranes together in a contiguous relation.

8. The method of claim 1 wherein the array is formed prior to contacting said membranes with said potting resins by forming said membranes together in a spaced apart relation.

9. The method of claim 1 wherein the potting resin is a thin stream deposited in a defined zone near one end of said membrane array.

10. The method of claim 1 further comprising the step of contacting a second thin stream of potting resin near an opposite end of said array of membranes.

11. The method of claim 1 further comprising the steps of forming a substantially parallel array of said membranes and subsequently spirally winding said array about an axis which is substantially parallel to a longitudinal axis of said membrane array while simultaneously applying said potting resin to the array of membranes to form circular bundle of fibers having at least one potted end.

12. The method of claim 11 further comprising the step of continuing to apply said potting resin after said circular bundle is formed to create a tubesheet of predetermined diameter about at least one end of said hollow fiber membranes.

13. The method of claim 1 further comprising the step of cutting the at least one potted end of the bundle orthogonally to the longitudinal axis of said hollow fiber membranes to form said bundle with at least one flat end surface having exposed lumens.

14. The method of claim 13 further comprising the step of mounting said bundle into a cartridge housing.

15. The method of claim 14 wherein the bundle is mounted in said housing by fusion bonding.

16. A. method of making a hollow fiber membrane cartridge comprising:

a. forming a plurality of hollow fiber membranes formed of one or more thermoplastic perfluorinated resins into a substantially parallel arrangement wherein the fibers are arranged in parallel arrangement along a length of the fibers; then

b. winding the plurality of hollow fibers about an axis which is substantially parallel to the length of the hollow fiber membranes so as to form a bundle having two bundle ends;

c. simultaneously with step (b), extruding a molten stream of a perfluorinated thermoplastic resin having a peak melting point at least 5°C below the peak melting point of the hollow fiber membranes and having a melt flow index of 100 g/10mins. or greater and directing said resin onto at least one of the two bundle ends to thereby pot one or more ends in said resin;

d. cooling the bundle;

e. heating the bundle at the one or more potted ends to a temperature at or above the peak melting point of the resin of the stream but below the peak melting point of the hollow fibers; and

f. exposing the lumen ends of the hollow fiber membranes at one or more potted bundle ends to communicate with the exterior of the bundle.

17. The method of claim 16 wherein both ends of the bundle are potted with the molten stream of the perfluorinated thermoplastic resin.

18. The method of claim 16 wherein both ends of the bundle are potted with the molten stream of the perfluorinated thermoplastic resin and wherein both ends of the bundle are exposed so that the lumen ends of the hollow fiber membranes can communicate with the exterior of the bundle.

19. A hollow fiber membrane cartridge including a bundle of potted hollow fiber membranes, made by the method of claim 1.

20. A hollow fiber membrane cartridge including a bundle of potted hollow fiber membranes, made by the method of claim 16.

21. The method of claim 16 further comprising the steps of:

g. inserting the bundle into a housing for the bundle having a first and second end and a cylindrical housing interior being suitably shaped to contain the membrane bundle, a first means for sealing the first end of the bundle to the interior of the housing adjacent its first end, a second means for sealing the second end of the bundle to the interior of the housing adjacent its second end, the housing having one or more means for dividing the bundle into at least two regions including a shell side space exterior to the portion of the bundle between the potted ends and a space including the lumens; then

h. applying a first end cap adjacent the first end of the housing to seal the first housing end; then

i. applying a second end cap adjacent the second housing end so as to seal the second housing end; and

j. providing a shell side access in the housing and at least one access in at least one of the first or second end caps.

22. A hollow fiber membrane cartridge including a bundle of potted hollow fiber membranes made by the method of claim 21.

23. A method according to claim 16 wherein the potting compound has melt flow index of from about 100 to about 200 g/10mins..

24. A method of forming a hollow fiber module comprising the steps of:

forming a substantially parallel array of hollow fiber membranes, wherein said membranes are formed of one or more thermoplastic perfluorinated resins,

forming one or more strips of potting material formed one or more thermoplastic perfluorinated resins along one or more portions of the array, wherein the potting material has a peak melting point at least 5°C below that of the hollow fiber membranes

winding the array upon itself in order to form a bundle,

heating said bundle to a temperature below the peak melting point of the hollow fibers and above the peak melting point of the one or more strips of potting material for a period sufficient to form a fluid-type seal between the potting material and the hollow fiber membranes.

25. The method of claim 24 wherein the one or more thermoplastic perfluorinated resins of the hollow fiber membranes and the potting material are selected from the group consisting of poly(tetrafluorethylene-co-perfluoro(alkylvinylether)), poly(tetrafluoroethylene-co-hexafluoropropylene) and blends thereof.

26. The method of claim 24 wherein the one or more strips of potting material is applied to the array of fibers as a molten stream.

27. The method of claim 24 wherein the one or more strips of potting material is applied to the array of fibers as a solid, preformed tape.